



**US Army Corps  
of Engineers®**

Engineer Research and  
Development Center

## Monitoring Completed Navigation Projects (MCNP)

### John Day Lock and Dam

#### Problem

The John Day Lock and Dam is located at River Mile 215.6 of the Columbia River. The dam is 1252 ft long with 20 50-ft gates. The powerhouse is 1975 ft long with 16 turbine units in operation and 4 skeleton units provided for future additional turbines. In 1999 flow deflectors were added to the dam to eliminate plunging flow into the stilling basin that causes increased dissolved oxygen and higher fish mortality. Near this same time, the operation of the spillway was modified to “bulk” flow from the spillway to the north adjacent to the lock during periods of low spill. After these changes were made, the local navigation industry reported having difficulties in the lower lock approach during spill conditions. The 1:80 scale physical model of the John Day Lock and Dam was unable to replicate the conditions as describe by the towing industry.



#### Research Approach

Side-looking acoustic doppler current meters have been installed between the powerhouse and spillway to monitor entrainment flow and two meters were mounted on the lower guard wall to monitor cross-currents in the lock approach. Time-lapse video is also being recorded during the spill season to observe operations of the tows and note any signs of increased navigation difficulty. The current information during these times will be cross matched to the reported operation of the powerhouse and spillway. This information will be compared to model data for use in calibrating the model. The model can then be used to address the navigation problems reported by the towing industry.



#### Labs/others involved

US Army Engineer Research and Development Center (ERDC), Coastal and Hydraulics Laboratory; US Army Engineer District, Portland

#### Final Products

Monitoring of the flow conditions during the spill season (April through October) along with observation of tows using the lock will be used to gain insight as to the cause of the reported navigation difficulties. Long term monitoring will provide information that will define under what operations that navigation conditions in the lower lock approach are adversely affected, what is the mechanism that is responsible, and give insight as to how these adverse impacts could be mitigated. This information may also prove beneficial to other sites on the Columbia and Snake Rivers where flow deflectors are being used. This information will be provided in a technical report.

#### Point of Contact

Donald C. Wilson, ERDC Coastal and Hydraulics Laboratory, 601-634-2813,  
Donald.C.Wilson@erdc.usace.army.mil